We Claim:

1. A reference pattern for a reference surface of a rotatable medium for use in a data storage device having at least one head positionable over the reference surface, comprising:

one or more servo wedges having a first end at an inner diameter of the reference surface and a second end at an outer diameter of the reference surface, the one or more servo wedges including:

a preamble extending from the first end to the second end, the preamble including digital information at a first frequency relative to the head when the rotatable medium is rotated at a spin speed;

at least one field extending from the first end to the second end and having:

a first set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a second set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

wherein a frequency of the at least one field relative to the head when the rotatable medium is rotated at the spin speed varies between the first end and the second end.

2. The reference pattern of claim 1, wherein the frequency of the at least one field between the first end and a transition region is the first frequency;

wherein the frequency of the at least one field between the transition region and the second end is a second frequency; and

wherein the transition region is between the first end and the second end.

3. The reference pattern of claim 2, wherein the frequency of the at least one field abruptly changes from the first frequency to the second frequency.

4. The reference pattern of claim 2, wherein the second frequency is higher than the first frequency.

5. A reference pattern for a reference surface of a disk connectable with a hard disk drive having at least one head positionable over the reference surface, comprising:

one or more servo wedges having a first end and a second end, the one or more servo wedges extending along a portion of a stroke of the at least one head and including:

a preamble extending from the first end to the second end;

at least one field extending from the first end to the second end and having:

a first set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a second set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

wherein a frequency of the at least one field relative to the head when the rotatable medium is rotated at a spin speed varies between the first end and the second end.

6. The reference pattern of claim 5, wherein the frequency of the at least one field between the first end and a transition region is a first frequency;

wherein the frequency of the at least one field between the transition region and the second end is a second frequency; and

wherein the transition region is between the first end and the second end.

7. The reference pattern for claim 6, wherein the preamble includes digital information at the first frequency relative to the head when the rotatable medium is rotated at the spin speed.

8. The reference pattern of claim 6, wherein the frequency of the at least one field abruptly changes from the first frequency to the second frequency.

9. The reference pattern of claim 6, wherein the second frequency is higher than the first frequency.

10. A reference pattern for a reference surface of a rotatable medium, comprising:

one or more servo wedges having a first end and a second end, the one or more servo wedges including:

a preamble extending along a portion of a stroke from the first end to the second end;

at least one field extending from the first end to the second end and having:

a first set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a second set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

wherein a frequency of the at least one field relative to the head when the rotatable medium is rotated at a spin speed varies between the first end and the second end.

11. The reference pattern of claim 10, wherein the frequency of the at least one field between the first end and a transition region is a first frequency;

wherein the frequency of the at least one field between the transition region and the second end is a second frequency; and

wherein the transition region is between the first end and the second end.

12. The reference pattern for claim 11, wherein the preamble includes digital information at the first frequency relative to the head when the rotatable medium is rotated at the spin speed.

13. The reference pattern of claim 11, wherein the frequency of the at least one field abruptly changes from the first frequency to the second frequency.

14. The reference pattern of claim 11, wherein the second frequency is higher than the first frequency.

15. A reference pattern for a reference surface of a rotatable medium connected with a data storage device having at least one head connected with an actuator, comprising:

one or more servo wedges having an inner edge at an inner diameter of

the reference surface and an outer edge at an outer diameter of the reference surface, the one or more servo wedges including:

a preamble extending from the inner edge to the outer edge, the preamble including digital information at a first frequency relative to the head when the rotatable medium is rotated at a spin speed;

a first field extending from the inner edge to the outer edge and having:

a first set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a second set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

a second field extending from the inner edge to the outer edge and having:

a third set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a fourth set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

wherein a frequency of the first field relative to the head when the rotatable medium is rotated at the spin speed and a frequency of the second field relative to the head when the rotatable medium is rotated at the spin speed vary between the inner edge and the outer edge.

16. The reference pattern of claim 15, wherein the first field frequency between the inner edge and a first transition is the first frequency;

wherein the first field frequency between the first transition and the outer edge is a second frequency;

wherein the second field frequency between the inner edge and a second transition is the first frequency; and

wherein the second field frequency between the second transition and the outer edge is the second frequency.

17. The reference pattern of claim 16, wherein the first transition and the second transition are located at different radial positions.

18. The reference pattern of claim 16, wherein the first transition is located at a radial position closer to the inner edge than the second transition.

19. The reference pattern of claim 16, wherein the first transition is located at a radial position closer to the outer edge than the second transition.

20. The reference pattern of claim 16, wherein a transition region exists between the first transition and the second transition.

21. The reference pattern of claim 16, wherein the first field frequency abruptly changes from the first frequency to the second frequency.

22. The reference pattern of claim 16, wherein the second field frequency abruptly changes from the first frequency to the second frequency.

23. The reference pattern of claim 16, wherein the second frequency is higher than the first frequency.

24. A reference pattern for a reference surface of a rotatable medium connected with a data storage device having at least one head connected with an actuator, comprising:

one or more servo wedges having a first end and a second end, the one or more servo wedges extending along a portion of a stroke of the at least one head and including:

a preamble extending from the first end to the second end;

a first field extending from the first end to the second end and having:

a first set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a second set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

a second field extending from the first end to the second end and having:

a third set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a fourth set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

wherein a frequency of the first field relative to the head when the rotatable medium is rotated at a spin speed and a frequency of the second field relative to the head when the rotatable medium is rotated at the spin speed vary between the inner edge and the outer edge.

25. The reference pattern of claim 24, wherein the first field frequency between the first end and a first transition is a first frequency;

wherein the first field frequency between the first transition and second end is a second frequency;

wherein the second field frequency between the first end and a second transition is the first frequency; and

wherein the second field frequency between the second transition and the second end is the second frequency.

26. The reference pattern for claim 25, wherein the preamble includes digital information at the first frequency relative to the head when the rotatable medium is rotated at a spin speed.

27. The reference pattern of claim 25, wherein the first transition and the second transition are located at different radial positions.

28. The reference pattern of claim 25, wherein the first transition is located at a radial position closer to the first end than the second transition.

29. The reference pattern of claim 25, wherein the first transition is located at a radial position closer to the second end than the second transition.

30. The reference pattern of claim 25, wherein a transition region exists between the first transition and the second transition.

31. The reference pattern of claim 25, wherein the first field frequency abruptly changes from the first frequency to the second frequency.

32. The reference pattern of claim 25, wherein the second field frequency abruptly changes from the first frequency to the second frequency.

33. The reference pattern of claim 25, wherein the second frequency is higher than the first frequency.

34. A reference pattern for a reference surface of a rotatable medium connected with a data storage device having at least one head adapted to be positioned over the reference surface, comprising:

one or more servo wedges having an inner edge at an inner diameter of the reference surface and an outer edge at an outer diameter of the reference surface, the one or more servo wedges including:

an inner diameter region extending from the inner edge to a first transition;

a transition region extending from the first transition to a second transition; and

an outer region extending from the second transition to the outer edge;

wherein at least a portion of each of the inner diameter region, the transition region, and the outer region, includes:

a preamble;

a first field, including:

a first set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a second set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

a second field, including:

a third set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a fourth set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

wherein in the inner region the first field is at the first frequency and the second field is at the first frequency;

wherein in the transition region one of the first field and the second field is at the first frequency and the other of the first field and the second field is at the second frequency; and

wherein in the outer region the first field is at a second frequency and the second field is at the second frequency.

35. The reference pattern of claim 34, wherein the preamble includes digital information at the first frequency.

36. The reference pattern of claim 34, wherein the first transition and the second transition are located at different radial positions.

37. The reference pattern of claim 34, wherein the first transition is located at a radial position closer to the inner edge than the second transition.

38. The reference pattern of claim 34, wherein the first transition is located at a radial position closer to the outer edge than the second transition.

39. The reference pattern of claim 34, wherein the first field frequency abruptly changes from the first frequency to the second frequency.

40. The reference pattern of claim 34, wherein the second field frequency abruptly changes from the first frequency to the second frequency.

41. The reference pattern of claim 34, wherein the second frequency is higher than the first frequency.

42. A system to self-servo write one or more disks in a hard disk drive, the system comprising:

a housing; and

a reference disk connected with the housing, the reference disk having a

reference surface;

wherein the reference surface includes:

one or more servo wedges having a first end at an inner diameter of the reference disk and a second end at an outer diameter of the reference disk, the one or more servo wedges including:

a preamble extending from the first end to the second end;

at least one field extending from the first end to the second end and having:

a first set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a second set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

wherein a frequency of the at least one field relative to the head when the reference disk is rotated at a spin speed varies between the first end and the second end.

43. The system of claim 42, wherein the frequency of the at least one field between the first end and a transition region is a first frequency;

wherein the frequency of the at least one field between the transition region and the second end is a second frequency; and

wherein the transition region is between the first end and the second end.

44. The system of claim 43, wherein the preamble including digital information at the first frequency relative to the head when the reference disk is rotated at the spin speed;

45. The system of claim 43, wherein the frequency of the at least one field abruptly changes from the first frequency to the second frequency.

46. The system of claim 43, wherein the second frequency is higher than the first frequency.

47. A system to self-servo write one or more disks in a hard disk drive, the system comprising:

a housing;

an actuator pivotally connected with the housing;

a head connected with the actuator such that the head traces a stroke when the actuator is pivoted; and

a reference disk connected with the housing, the reference disk having a reference surface;

wherein the reference surface includes:

one or more servo wedges having a first end and a second end, the one or more servo wedges extending along a portion of the stroke and including:

a preamble extending from the first end to the second end;

at least one field extending from the first end to the second end and having:

a first set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a second set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

wherein a frequency of the at least one field relative to the head when the reference disk is rotated at a spin speed varies between the first end and the second end.

48. The system of claim 47, wherein the frequency of the at least one field between the first end and a transition region is a first frequency;

wherein the frequency of the at least one field between the transition region and the second end is a second frequency; and

wherein the transition region is between the first end and the second end.

49. The system of claim 48, wherein the preamble including digital information at the first frequency relative to the head when the reference disk is rotated at the spin speed;

50. The system of claim 48, wherein the frequency of the at least one field abruptly changes from the first frequency to the second frequency.

51. The system of claim 48, wherein the second frequency is higher than the first

frequency.

52. A system to self-servo write one or more disks in a hard disk drive, the system comprising:

a housing; and

a reference disk connected with the housing, the reference disk having a reference surface;

wherein the reference surface includes:

one or more servo wedges having an inner edge at an inner diameter of the reference surface and an outer edge at an outer diameter of the reference surface, the one or more servo wedges including:

a preamble extending from the inner edge to the outer edge;

a first field extending from the inner edge to the outer edge and having:

a first set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a second set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

a second field extending from the inner edge to the outer edge and having:

a third set of a plurality of phase-bursts forming a positive chevron angle relative to the preamble;

a fourth set of a plurality of phase-bursts forming a negative chevron angle relative to the preamble; and

wherein a frequency of the first field relative to the head when the rotatable medium is rotated at a spin speed and a frequency of the second field relative to the head when the rotatable medium is rotated at the spin speed vary between the inner edge and the outer edge.

53. The system of claim 52, wherein the first field frequency between the inner edge and a first transition is a first frequency;

wherein the first field frequency between the first transition and outer edge is a second frequency;

wherein the second field frequency between the inner edge and a second transition is the first frequency; and

wherein the second field frequency between the second transition and the outer edge is the second frequency.

54. The system for claim 53, wherein the preamble includes digital information at the first frequency relative to the head when the rotatable medium is rotated at a spin speed.

55. The system of claim 53, wherein the first transition and the second transition are located at different radial positions.

56. The system of claim 53, wherein the first transition is located at a radial position closer to the inner edge than the second transition.

57. The system of claim 53, wherein the first transition is located at a radial position closer to the outer edge than the second transition.

58. The system of claim 53, wherein a transition region exists between the first transition and the second transition.

59. The system of claim 53, wherein the first field frequency abruptly changes from the first frequency to the second frequency.

60. The system of claim 53, wherein the second field frequency abruptly changes from the first frequency to the second frequency.

61. The system of claim 53, wherein the second frequency is higher than the first frequency.

62. A method to measure a servo pattern on a reference surface of a disk in a hard disk drive having a head, the servo pattern including one or more servo wedges having a preamble at a first frequency and at least one field including a plurality of phase-bursts at the first frequency from an inner diameter of the disk to a transition region of the disk,

and at a second frequency from a transition region to an outer diameter of the disk, the method comprising:

rotating the disk;

positioning the head over the reference surface;

determining a position of the head over the reference surface;

sampling the preamble with the head;

filtering samples from the preamble;

sampling the plurality of phase-bursts of the at least one field with the head;

determining a phase-burst signal based on samples from the plurality of phase-bursts;

filtering samples from the phase-burst signal;

wherein when the head is positioned between the inner diameter and the transition region, the phase-burst signal is determined to be the samples from the plurality of phase-burst; and

wherein when the head is positioned between the transition region and the outer diameter, the phase-burst signal is determined by converting the samples from the plurality of phase-burst from the second frequency to the first frequency.

63. A method to measure a plurality of phase-bursts on a reference surface of a disk in a hard disk drive having a head, the servo pattern, the method comprising:

providing a reference pattern on the reference surface, the reference pattern including one or more servo wedges having a preamble at a first frequency and at least one field including the plurality of phase-bursts at the first frequency from an inner diameter of the disk to a transition region of the disk, and at a second frequency from a transition region to an outer diameter of the disk

rotating the disk;

positioning the head over the reference surface;

determining a position of the head over the reference surface;

sampling the preamble with the head;

filtering samples from the preamble;

sampling the plurality of phase-bursts of the at least one field with the head;

determining a phase-burst signal based on samples from the plurality of phase-bursts;

filtering samples from the phase-burst signal;

wherein when the head is positioned between the inner diameter and the transition region, the phase-burst signal is determined to be the samples from the plurality of phase-burst; and

wherein when the head is positioned between the transition region and the outer diameter, the phase-burst signal is determined by converting the samples from the plurality of phase-burst from the second frequency to the first frequency.

64. A method to measure a first set of a plurality of phase-bursts and a second set of a plurality of phase-bursts on a reference surface of a disk in a hard disk drive having a head, the servo pattern, the method comprising:

providing a reference pattern on the reference surface, the reference pattern including one or more servo wedges having a preamble at a first frequency, a first field including the first set at the first frequency from an inner diameter of the disk to a first transition of the disk, and at a second frequency from the first transition to an outer diameter of the disk, and a second field including the second set at the first frequency from an inner diameter of the disk to a second transition of the disk, and at a second frequency from the second transition to an outer diameter of the disk;

rotating the disk;

positioning the head over the reference surface;

determining a position of the head over the reference surface;

sampling the preamble with the head;

filtering samples from the preamble;

sampling the plurality of phase-bursts with the head;

determining a first phase-burst signal based on samples from the first field;

determining a second phase-burst signal based on samples from the second field;

filtering samples from the first phase-burst signal; and

filtering samples from the second phase-burst signal.

65. The method of claim 64, wherein when the head is positioned between the inner diameter and the first transition, the first phase-burst signal is determined to be the samples from the first field;

wherein when the head is positioned between the first transition and the outer diameter, the first phase-burst signal is determined by converting the samples from the first field from the second frequency to the first frequency;

wherein when the head is positioned between the inner diameter and the second transition, the second phase-burst signal is determined to be the samples from the second field; and

wherein when the head is positioned between the second transition and the outer diameter, the second phase-burst signal is determined by converting the samples from the second field from the second frequency to the first frequency.

66. The method of claim 65, wherein the first transition is located at a radial position closer to an outer outer diameter than the second transition.

67. The method of claim 65, wherein the first transition is located at a radial position closer to an inner diameter than the second transition.